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03.01-7/29/98-00677

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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Philadelphia, Pennsylvania 19107

SUB-JECT: Norfolk Naval Base: 1998 Draft Ecological Risk Assessment for Bousch Creek and Camp Allen Landfill **DATE:** 7/29/98

FROM: Barbara Okorn, Coordinator
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TO: Harry Harbold, RPM (3HS50)
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The ERA for Bousch Creek and the Camp Allen Landfill (CALF) at the Norfolk Naval Base was a screening level risk assessment, and as such did not provide a detailed assessment of possible risks to terrestrial and aquatic receptors on or near the Site. A number of issues with the document resulted in questioning the validity of the results

- Page 1-2: Table 1-1 is a list of the COPCs from the Baker (1995) baseline risk assessment. The authors need to include a statement about whether the detection limits for all of these contaminants were below the screening guidelines and the screening guidelines were in concert with EPA BTAG.
- Page 1-4, section 1.4 (Assumptions): States that "the process [screening level risk assessment] also allows for the elimination of contaminants of potential concern (COPC) when the results of screening, exposure models, or site specific toxicity data suggest no little or no adverse effects to receptors." The latter part of the sentence does not make sense as written. The first "no" should be removed from the sentence.
- Page 1-4, Section 1.4, Second to last bullet: The seventh bullet contains the following incomplete sentence: "For receptors whose activities are primarily terrestrial, the concentration of each COPC in sediment was used as" The missing portion of this sentence should be added.
- Section 2 should include a section on state and federal threatened and endangered species.
- Page 2-5-the discussion of the mixing zone should be moved to a risk management section. This is not necessarily part of the ERA.

- Page 3-1, section 3. (Initial Screening for Contaminants of Potential Concern): The statement is made that "If compounds equaled or exceeded these conservative screening benchmarks (HQ(1), they were considered COPCs and retained for further evaluation using ingestion-based exposure models for potential receptor species." This section should clearly discuss the differences between the acute and chronic effects to the individual organisms and the food chain implications of these same contaminants. The document does not address direct impacts to receptors.
- Page 3-1, It seems that sediment was collected from 0-18". This should be clarified in text. Generally, only the top few inches are a concern for ecological receptors.
- Page 3-2, section 3.2 (Surface Water): The statement is made that "The benchmark screening levels used were those for marine water because nearly every sample location is tidally influenced." This statement does not take into account those situations where tides influence a freshwater regime. Salinity would probably be a better determinant of marine than "...tidally influenced."
- Page 3-2, section 3.2: There are a number of references to a contaminant not having an HQ(1 in one media and not detected in the other media. The authors should clearly indicate that the detection limits were less than the screening value in these cases of "not detected."
- Page 4-3, section 4.2 (Measurement Endpoints): The measurement endpoint for vegetation is listed as: "For the assessment endpoint that addresses vegetation from the toxic effects of contaminants in sediment and surface water to maintain viable habitat for wildlife." This discussion does not indicate what will be done to ensure that viable habitat for wildlife will be maintained. This should be clarified. Terrestrial vegetation should be addressed.
- Table 3-2-It is unclear why filtered water data is provided. Unfiltered is used for the ERA.
- Keys should be provided on the tables. For example "H" is not detected on table 3-4.
- Page 5-1, Chapter 5 (Exposure Assessment): No explanation was provided for why or how a dose was used in assessing risk in fish species. Very few, if any, studies have been conducted that measured the actual dose (i.e., mg food/kg body wt./day) a fish receives, as there are no practical or easy ways

to accurately administer chemicals to fish via their food, other than gastric gavage. Generally, studies with fish report exposure as concentration in the ambient water or report tissue concentrations of a chemical that are associated with some effect. This fact is reflected in Tables D-7 and D-8 of the document that list LOAELs and NOAELs for the COPC in striped bass and spot, respectively. For nearly all of the COPCs no LOAELs or NOAELs were found based on dose. Because of this lack of data, the conclusions of the ERA regarding potential risks to fish in Bousch Creek are questionable.

- Page 5-1, section 5.1 (Introduction): The statement is made that "...this assessment also calculated NOAEL HQs and LOAEL HQs using the mean contaminant concentration detected in addition to the maximum concentrations." The dose is calculated using the minimum body weight. However, in subsequent sections of chapter 5 (Exposure Assessment) there is evidence that minimum body weight is not being used. Examples include (at a minimum) the following:

Page 5-3, section 5.2.1 (Muskrat): This section indicates that the muskrat body weight ranges from 0.5 to greater than 2.0 kg. However, a body weight of 0.837 kg was used in the risk calculations. Section 5.1 indicates that the dose will be calculated using the "receptor species minimum weight." This section should clearly discuss why the minimum body weight of the muskrat (0.5 kg) was not used in these calculations.

Page 5-3, section 5.2.2 (Great Blue Heron): In this section the mean weights of males and females are listed as 2.576 kg and 2.204 kg, respectively. This section should explain why the mean female body weight is used for ingestion calculations and not the minimum body weight.

This chapter should be revised to correct and/or explain deviations from the use of minimum body weights in the dose calculations.

- Page 5-1 states that "In situations where the resultant mean was greater than the detected maximum, due to a biased "high" non-detect, the default value used in the exposure calculations was the detected maximum concentration. This approach was taken because it represents a more realistic conservative concentration." While this may be the most realistic, it is not the most conservative. The most conservative approach would be to take the highest value. Please clarify this point in the text.
- Page 5-5, section 5.2.7 (Striped bass): The statement is made "For purposes of this risk assessment, fish comprised the other 100 percent of the diet." This sentence should be changed to: "For...fish comprised 100

percent of the diet."

- Page 5-5, sections 5.2.7 and 5.2.8 (Spot): The ERA listed the same ingestion rate for striped bass and spot of 0.133 kg/day. Considering that the weights of the striped bass and spot used in the ERA were 2.27 kg and 0.113 kg, respectively, it is unlikely that the ingestion rates for the two species are identical. The spot would be eating more than its body weight each day, while the striped bass would only be consuming about 6 percent of its body weight per day. This consumption rate was used in calculating contaminant doses for both species, but the listed consumption rate appears to be too great for spot and too low for the striped bass. The authors need to carefully reevaluate the use of this consumption rate.

Page 5-5, Section 5.2.7 and 5.2.8. It may have more useful to collect fish and analyze tissue samples to determine concentrations of contaminants in fish. At least with this information it would have been possible to determine if fish are accumulating contaminants and it may have been possible to relate tissue concentrations of some contaminants (e.g., PCBs and mercury) with effects. In its present form, the risk characterization for fish is inconclusive.

- Pages 6-10 to 6-12 discusses the fate and effects of polycyclic aromatic hydrocarbons (PAH) in the environment. Toxicity of PAHs can be dramatically increased, in particular to aquatic organisms, in the presence of natural sunlight. A discussion describing the photo-enhanced toxicity of PAHs in the presence of natural sunlight should be included in this section.
- Table 7-3 (COPC List of Chemicals with HQs > 1.0 after Most Conservative Exposure Calculations): There is at least one major inconsistency in this table. For nine of the contaminants listed the reason for including or excluding the contaminant as a COPC after exposure is listed as "All receptors HQ < 1, HQ > 1:Spot." In each of these cases, if the HQ for one of the receptors exceeds 1, then the contaminant should be retained as a COPC. This table should be revised appropriately. Also, when there is no benchmark for a receptor, the contaminant should be retained as a COPC. Again, the table should be revised appropriately.
- Page 9-1 (Conclusions): This chapter is confusing. The presentation of which contaminants are COPCs in which media is not clear. For example, in paragraph 4 on page 9-1 both surface water and sediment contaminants are discussed. Of the 64 contaminants detected in sediment, 8 had HQs < 1, which leaves 56 contaminants to be carried forward in the risk assessment, but this is not stated. Also, of the 52 detected contaminants in surface water, 28 did not have benchmarks, which means 24 did have benchmarks.

But 4 of this group of 24 were considered non-toxic. Therefore, 20 detected contaminants that had benchmarks also had HQs > 1 and should be retained for further analysis along with the 28 that did not have benchmarks. But this paragraph indicates that only 24 contaminants in surface water were retained for further analysis.

- This fifth paragraph on page 9-1 indicates that "Of the 52 chemicals detected in surface water, 30 could be eliminated as surface water COPCs...because their hazard quotients, resulting from a comparison against BTAG benchmark screening values, were less than 1.0...." This means that 22 COPCs remain. How do these 22 contaminants compare to the 24 listed in the previous paragraph? Again, what about the 28 contaminants that did not have benchmarks? This entire chapter should be rewritten and when the logic trail is adequately presented, the recommendation of no further action may not be appropriate nor supported by this ERA.
- On page 9-1 the following statement was made: "A 4,600-foot underground culvert connects Bousch Creek to Willoughby Bay. This is probably sufficiently long to discourage most larger estuarine fish species (especially bottom species because the outfall is above the bottom of the floor of Willoughby Bay) from routinely entering Bousch Creek and foraging near the Camp Allen Landfill. The fish population that exists is assumed to be comprised primarily of resident species."

The statement is most likely correct, but it calls into question the selection of the receptor species (i.e., striped bass and spot). According to the above statement, estuarine fish would probably not have access to the creek, but both receptor species are estuarine species. According to the ERA, the objective was to assess potential risks to species using Bousch Creek and its drainages. The selected species would more likely be found in Willoughby Bay, to which Bousch Creek discharges. Considering that only one sediment/surface water sampling station was located in Willoughby Bay at the discharge point of the Bousch Creek outfall, it may be more appropriate to include fish species more likely to be found within the creek. Additionally, it is also recommended that the ERA be expanded to assess the potential risks to ecological receptors within Willoughby Bay. As stated above, only one sample station was located within the bay (SD/SW 14). Elevated concentrations of mercury (4.6 mg/kg) and lead (138 mg/kg) were reported in the single sediment sample from Willoughby Bay. Considering the number of outfalls entering Willoughby Bay (78), it seems likely that receptors using the bay could be potentially at risk. This needs to be evaluated.

- Page 9-1, Chapter 9 (Conclusions): Benthic macroinvertebrate data were presented in Table 4-12 (page 4-69) in Appendix A of the ERA document,

but these data were not discussed in the text of the document, nor were the risks to the benthic community adequately addressed in section 5.2 (Exposure Profiles) or the conclusions section. Although protection of the benthic community was listed as one of the assessment endpoints on page 4-1 of the document, it was not clear from the conclusions section whether the ERA considered the benthic community at risk or not. This should be clarified.

- Page 9-6 (Conclusions): The recommendation of the ERA that the site be considered for no further action is premature. The ERA failed to consider Bousch Creek as a source of contamination to Willoughby Bay, and the single sample collected from the bay provided insufficient data to assess whether or not biota within the bay are at risk. The ERA needs to be expanded to include Willoughby Bay. Benthic macroinvertebrate sampling of Willoughby Bay should also be included. The threat to fish and benthic invertebrate species, especially in Willoughby Bay, has not been adequately addressed in this ERA.

Thank you for the opportunity to offer these comments. If you have any questions, please contact me at x3330.